

Alternative Ratemaking Treatments for Grid Resilience Programs

NARUC-NASEO Resilience Regulatory Mechanisms Cohort
30 September 2024

Mark Newton Lowry, PhD

President

Pacific Economics Group Research, LLC

This work was funded by the U.S. Department of Energy under Contract No. DE-AC02-05CH11231



Introduction

The energy transition¹ entails extraordinary challenges for utilities today.

- Maintain/improve reliability & resiliency of aging, more vulnerable grid
- Enable load growth from beneficial electrification and other sources
- Reduce environmental damage from power generation

Where earnestly pursued, these tasks tend to raise costs more than load growth raises revenue.

>>> A ratemaking strategy must be chosen to fund resiliency and other energy transition programs. Issues are numerous and complicated.

This presentation details and appraises ways to fund these programs with particular attention to multiyear rate plans.

¹ Underlined terms are defined in the Glossary of Terms in this slide deck.

Alternative Ways to Fund Resiliency

Here are some salient ratemaking options where resiliency is a priority.

(1) Frequent (e.g., Annual) Rate Cases

Rate cases reset revenue requirement to reflect utility's forecasted (or recent historical) cost. No trueups made to actual cost incurred in rate year.

(2) Formula Rates

Cost of service formula causes revenue to track utility's *actual* cost. Widely used by Federal Energy Regulatory Commission ("FERC").

(3) Less Frequent Rate Cases + Supplemental Resiliency Funding

Supplemental funding may or may not be trued up to actuals

(4) Multiyear Rate Plans (MRPs) (discussed later)

Utilities generally prefer approaches that increase the likelihood of capital cost recovery.

Criteria for Choosing a Funding Approach

Ratemaking approaches for resiliency can be appraised using several criteria.

- 1. Was funding sufficient to achieve satisfactory resiliency?**
- 2. What was the effect of the approach on the efficiency of...**
 - **utility resiliency programs?**
 - **other utility operations?**

The approach to funding resiliency is sometimes applied to other costs as well.

- 3. Is the ratemaking process *itself* efficient?**

This matters most to commissions that regulate...

- numerous utilities (e.g., Ontario, Great Britain, and FERC)
- huge utility industries (e.g., CA)

Efficiency time savings are available to address energy transition.

Why is Utility Efficiency a Concern?

To the extent that a utility's revenue tracks its *actual* cost, cost efficiency is discouraged.

Overcapitalization is a particular concern.

Telltale signs of overcapitalization:

- premature replacement of aging assets
- excessive capacity additions
- capex favored over opex solutions — for example:
 - network undergrounding vs. better tree trimming
 - capacity expansion vs. peak load management
 - grid vs. distributed energy resource (DER) solutions
 - self-generation vs. power purchases

What Are Multiyear Rate Plans?

Key Components

- Rate case moratorium (e.g., 3-5 year rate case cycle)
- Between rate cases, an attrition relief mechanism (ARM) provides automatic rate relief for attrition using *predetermined formulas that are not linked* (like a cost tracker or formula rate) *to the utility's contemporaneous cost growth*.
>>> Stronger utility cost containment incentives, streamlined regulation
- Costs of some inputs (e.g., energy) get tracker treatment
- Performance incentive mechanisms (PIMs) for blue sky reliability

Optional “Bells and Whistles”

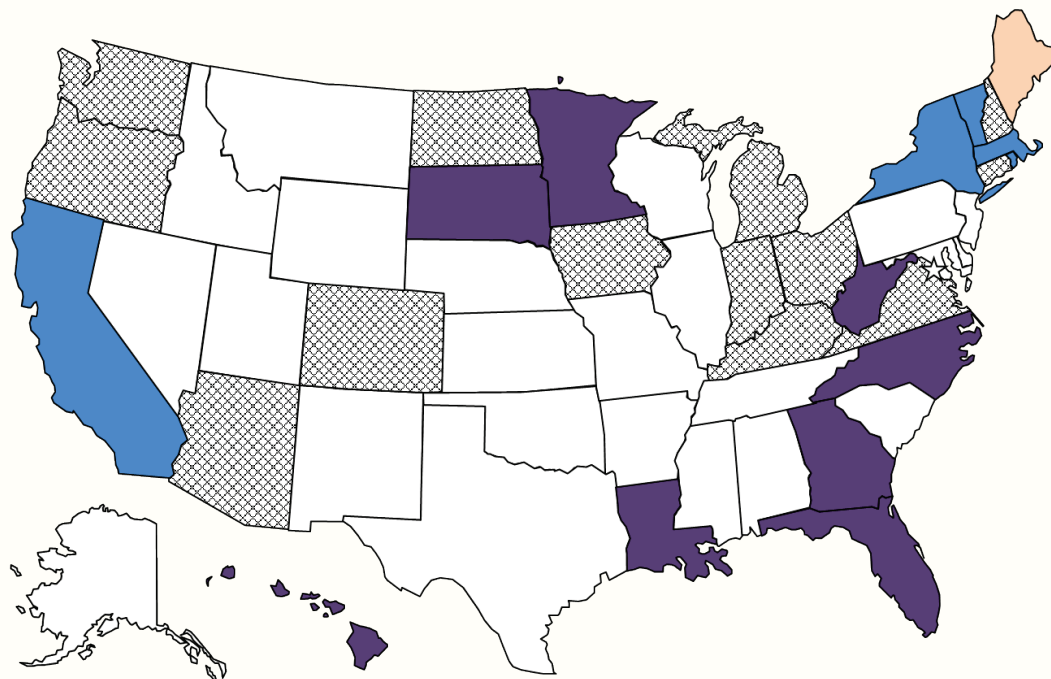
- Additional metrics and PIMs (e.g., conservation, peak load management, DER accommodation)
- Revenue decoupling
- Targeted incentives for underused practices [e.g., pilot programs for peak load pricing and cost tracker for demand-side management (DSM)]
- Integrated resource and delivery system planning

MRPs Precedents

MRPs first used in US railroad and telecom industries. Both industries achieved rapid productivity growth
MRPs now popular for electric utility retail rates.

California and Northeast (e.g., MA and NY) were MRP pioneers.

Recent legislation encourages MRPs in CT, NC and WA state.



Electric Gas Gas & Electric Expired


MRPs much *more* popular in countries overseas such as Canada, Great Britain, Australia

Comparing the Options

Resiliency funding options have varying impacts on performance incentives and regulatory cost.

Utility Cost Containment Incentives of Resiliency Funding Options

Regulatory Cost

 Better	Resiliency Costs		Other Costs	
	Multiyear Rate Plans	Depends	Strongest	Low
	Less-frequent Rate Cases + Supplemental Resiliency Funding	Depends	Stronger	Medium
	Frequent Rate Cases	Weak	Weak	High
	Formula Rates	Weakest	Weakest	Low
Worse				

ARM Design Options That Can Fund Resiliency

Several ARM design approaches can fund resilience programs

Predetermined Stair Steps

e.g., 3% in 2024, 6% in 2025, 1% in 2026

Stairsteps usually based on cost “forecasts”

Many utilities prefer this approach, which preapproves capex budget
[e.g., NY, MN]

Indexing + Supplemental Resilience Revenue

e.g., *growth Revenue = Inflation + growth Customers*
– X Factor – Stretch Factor

X factor reflects industry total factor productivity trend

Utilities frequently ask for and receive supplemental capital revenue, which may or may not be trued up to actuals [e.g., MA, Ontario]

ARM Design Options (cont'd)

Hybrid + Supplemental Resilience Revenue

Indexing for operation and maintenance (O&M) revenue

Capital revenue stairsteps may reflect:

- multiyear capex forecasts [e.g., Australia]

- test year capex

- average historical capex [e.g., CA, Alberta, & MA]

Tracker/Freeze + Supplemental Resilience Revenue

Track some rapidly-growing (e.g., generation) costs and otherwise freeze rates [e.g., FL, LA, WV]

Planning evidence informs ARM design in many MRP jurisdictions

Other MRP Provisions Also Affect Resiliency

Some other MRP provisions can also encourage resiliency

- Resiliency metrics and PIMs (see Cappers' presentation)¹
- Cost trackers for DSM and DER accommodation
- Pilot programs for innovative resiliency programs
- Integrated system and (if applicable) resource planning

Absent provisions explicitly encouraging reliability and resiliency, stronger cost containment provisions of MRPs can *jeopardize* resilience [e.g., Pacific Gas & Electric].

¹ Peter Cappers, "Data and Scorecards and PIMS – Oh My! Ways to Drive Utility Performance Improvements in Resilience." Presentation to NARUC-NASEO Resilience Regulatory Mechanisms Cohort, September (2024).

MRP Case Study: Southern California Edison

Plan Term: 3 years beginning January 2021

Hybrid ARM

O&M revenue escalated using utility input price indexes

Annual non-wildfire capital additions (except new service connections): test year capital additions

Wildfire capital additions based on forecast

Cost Trackers for DSM, wildfire risk mitigation, microgrids, DER demonstration projects, replacement of poles and underground structures in poor condition

Other Resilience Provisions: Wildfire mitigation plans, microgrid incentive program

Reference: California Public Utilities Commission Decision 21-08-036

MRP Case Study: Florida Power & Light

Plan Term: 2022-2025 (4 years)

Cost Trackers & Deferrals

- Fuel & purchased power
- Solar generation capex
- Storm cost recovery
- Storm protection plan
- DSM
- Environmental compliance capex
- Permanent federal or state tax changes (if they occur)

Revenue rises with load growth

Reference: Florida Public Service Commission Docket No. 20210015-EI

Conclusions

How best to fund improved resilience and other energy transition goals is an emerging challenge in utility ratemaking.

Smart approaches balance several considerations:

- Achievement of satisfactory progress
- Encouragement of cost efficiency
- Efficient ratemaking

Many utilities will use rate cases + cost trackers.

A *well*-designed MRP can improve system resilience and utility efficiency incentives for most costs while streamlining regulation.

A *poorly*-designed MRP can, alternatively, jeopardize resiliency.

Appendix



Acronyms

AMI	Advanced metering infrastructure
COSR	Cost of service regulation
DG	Distributed generation
DSM	Demand-side management
MFP	Multifactor productivity
MRP	Multiyear rate plans
O&M	Operation and maintenance
PBR	Performance-based ratemaking
PIM	Targeted performance incentive mechanism

Glossary of Terms

Advanced Metering Infrastructure (AMI): An integrated system of smart meters, communications networks, and data management systems that enables two-way communication between the electric company and customers.

Attrition Relief Mechanism (ARM): A key component of multiyear rate plans which uses a predetermined formula to adjust utility rates between general rate reviews without closely tracking the growth of all of the company's *own* costs. Methods used to design ARMs include forecasts and indexation to quantifiable external cost drivers such as inflation and customer growth.

Base Rates: The components of an electric company's rates which provide compensation for costs of non-energy inputs such as labor, materials, services, and capital.

Beneficial Electrification: Replacement of fossil-fueled equipment such as motor vehicles and space heaters with alternative equipment that is powered by electricity.

Capex: Capital expenditures.

Cost of Service Regulation (COSR): The traditional North American approach to ratemaking which resets base rates in irregularly timed rate cases to reflect the cost of service that regulators deem prudent.

Cost Tracker: A mechanism providing expedited recovery between rate cases of targeted costs that are deemed prudent by regulators. A tracker is an account of costs that are eligible for recovery. Costs deemed prudent can be recovered promptly with a rate surcharge (aka "rider") or deferred as "regulatory assets" for future recovery. Tracker treatment was traditionally limited to costs that are large, volatile, and largely beyond the control of the electric company. In more recent years, trackers have been used to address rapidly rising costs and costs of underused practices.

Demand-Side Management: Energy conservation, peak load management, and other activities intended to reduce use of a utility system.

Glossary of Terms (cont'd)

Distributed Energy Resources (DERs): Technologies, services, and practices that can improve efficiency or generate, manage, or store energy on the customer side of the meter. DERs include energy efficiency and demand response programs, distributed generation, energy management systems, and batteries.

Energy Transition The transition of the economy to greater reliance on electricity that is generated from clean resources.

Federal Energy Regulatory Commission (FERC): The federal agency responsible for regulating rates for utility services offered in interstate commerce. These services include power transmission, bulk power supply, and interstate gas pipeline transportation and storage.

Formula Rate Plan (FRP): A formula rate plan is designed to make a company's revenue closely track its own cost of service. It typically entails a mechanism for truing up a utility's revenue to the portion of its actual costs that regulators deem prudent. Formula rates are widely used by the FERC in power transmission regulation.

Multi-Year Rate Plan (MRP): A common approach to PBR that typically features a multiyear moratorium on general rate reviews, an attrition relief mechanism, and several PIMs. Regulatory schemes in some states are *called* MRPs but act more like formula rates due to fine-print "reconciliation mechanisms" (e.g., DC, IL, MD).

Opex: Operation and maintenance expenses.

Performance-Based Regulation (PBR): An approach to ratemaking designed to strengthen utility performance incentives. Some PBR approaches also streamline ratemaking.

Performance Incentive Mechanism (PIM): A mechanism consisting of one or more metrics, targets, and financial incentives (rewards and/or penalties) that is designed to strengthen performance incentives in a targeted area such as reliability or energy efficiency.

Glossary of Terms (cont'd)

Performance Metric System: A system of metrics used to appraise the performance of an electric company in one or more areas (e.g., reliability, environmental performance, and cost). These systems may include metrics without targets, metrics with targets, and PIMs.

Productivity: The ratio of outputs to inputs is a rough measure of operating efficiency which controls for the impact of input prices and operating scale on cost. Studies of total factor productivity trends (which consider both capital and O&M inputs) have been used in many MRP proceedings to set the X factors of indexed ARM formulas.

Rate Case: A proceeding to reset an electric company's base revenue requirement to better reflect the cost of service. These proceedings may also consider other issues such as rate designs.

Rate Case Moratorium: A set period of time without general rate cases.

Rate Rider: A mechanism, frequently outlined on tariff sheets, which allows an electric company to receive rate adjustments between rate cases.

Revenue Cap Index: A formula sometimes used for escalating allowed revenue in MRPs which typically includes an inflation index and an X factor.

Revenue Decoupling: A mechanism for relaxing the link between an electric company's revenue and use of its system, which makes periodic rate adjustments to ensure that actual revenue closely tracks allowed revenue between rate reviews. A companion revenue adjustment mechanism typically escalates allowed revenue between rate reviews for a key cost driver such as customer growth.

Glossary of Terms (cont'd)

Revenue Requirement: The annual revenue that the electric company is entitled to collect as compensation for the cost of service. The amount is periodically recalculated in rate reviews to reflect costs and may be escalated by other mechanisms (e.g., cost trackers and ARMs) between rate reviews. The corresponding cost is typically the sum of operation and maintenance expenses, depreciation, taxes, and a return on rate base less other operating revenues.

Test Year: A specific period in which an electric company's costs and billing determinants are considered in a rate review. Some states use a historical test year and adjust billing determinants and costs for known and measurable changes. Other states use a fully-forecasted test year that considers other possible changes.

X-Factor (aka Productivity Factor): A term in an indexed ARM formula which reflects the typical impact of productivity growth on cost growth. The X factor may also incorporate a stretch factor and an adjustment for the inaccuracy of the inflation measure that is used in the ARM formula.

Resources

Green Mountain Power: Multi-Year Regulation Plan 2023-2026, October 1, 2022.

<https://greenmountainpower.com/wp-content/uploads/2022/09/Multi-Year-Regulation-Plan.pdf>

Cappers, Peter (2024). “Data and Scorecards and PIMS – Oh My! Ways to Drive Utility Performance Improvements in Resilience.” Presentation to NARUC-NASEO Resilience Regulatory Mechanisms Cohort, September.

Lowry, Mark Newton, Matt Makos, and Gretchen Waschbusch (2024). Innovative Regulatory Tools for Addressing an Increasingly Complex Energy Landscape: 2023 Update, Edison Electric Institute, February.

Lowry, Mark Newton, David Hovde, Rebecca Kavan, and Matthew Makos (2023). “Impact of Multiyear Rate Plans on Power Distributor Productivity: Evidence from Alberta,” *The Electricity Journal*, Volume 36, Issue 5, June.

Lowry, Mark Newton, Matthew Makos, and Jeff Deason (2017). Ed. L. Schwartz. State Performance-Based Regulation Using Multiyear Rate Plans for U.S. Electric Utilities, Lawrence Berkeley National Laboratory.

https://eta-publications.lbl.gov/sites/default/files/multiyear_rate_plan_gmlc_1.4.29_final_report071217.pdf

Lowry, Mark Newton and Tim Woolf (2016). Performance-Based Regulation in a High Distributed Energy Resources Future, Lawrence Berkeley National Laboratory. https://emp.lbl.gov/sites/all/files/lbnl-1004130_0.pdf

Disclaimer

This document was prepared as an account of work sponsored by the United States Government. While this document is believed to contain correct information, neither the United States Government nor any agency thereof, nor The Regents of the University of California, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or The Regents of the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof, or The Regents of the University of California.

Ernest Orlando Lawrence Berkeley National Laboratory is an equal opportunity employer.

About Dr. Lowry

- President, Pacific Economics Group Research LLC (“PEG”)
- Active in PBR field since 1989
- **Specialties:** PBR mechanism design, input price and productivity research, statistical benchmarking, testimony
- **Recent clients:** Avangrid, Consumers’ Coalition of Alberta, Association Québécoise des Consommateurs Industriels d’Électricité, British Columbia Utilities Commission, Duke Energy, Hawaiian Electric, Lawrence Berkeley National Lab, Ontario Energy Board, Public Service New Mexico, Puget Sound Energy
- Former Penn State University energy economics professor
- PhD Applied Economics, University of Wisconsin-Madison

Speaker Contact Information

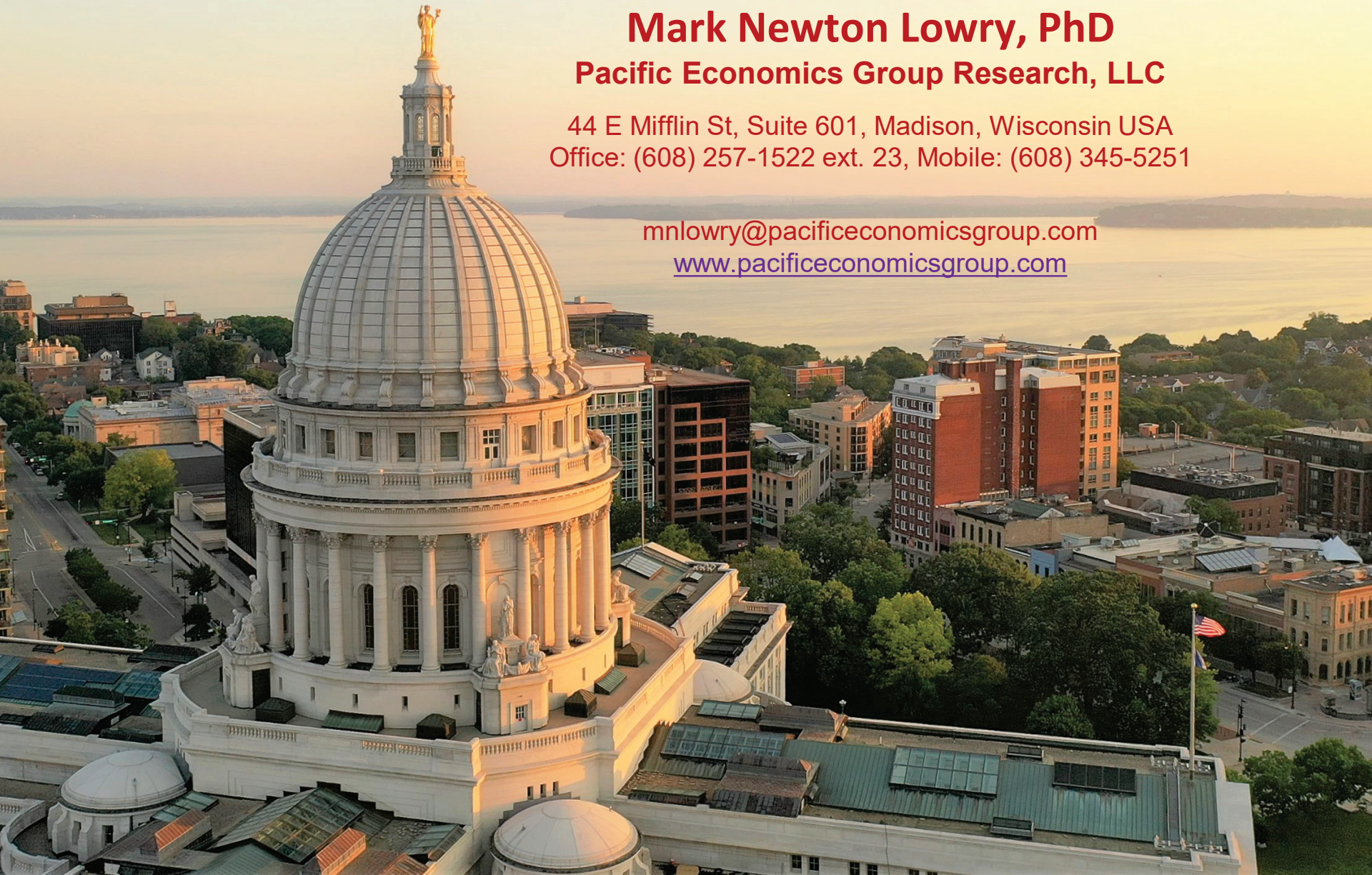
Mark Newton Lowry, PhD

Pacific Economics Group Research, LLC

44 E Mifflin St, Suite 601, Madison, Wisconsin USA
Office: (608) 257-1522 ext. 23, Mobile: (608) 345-5251

mnlowry@pacificeconomicsgroup.com

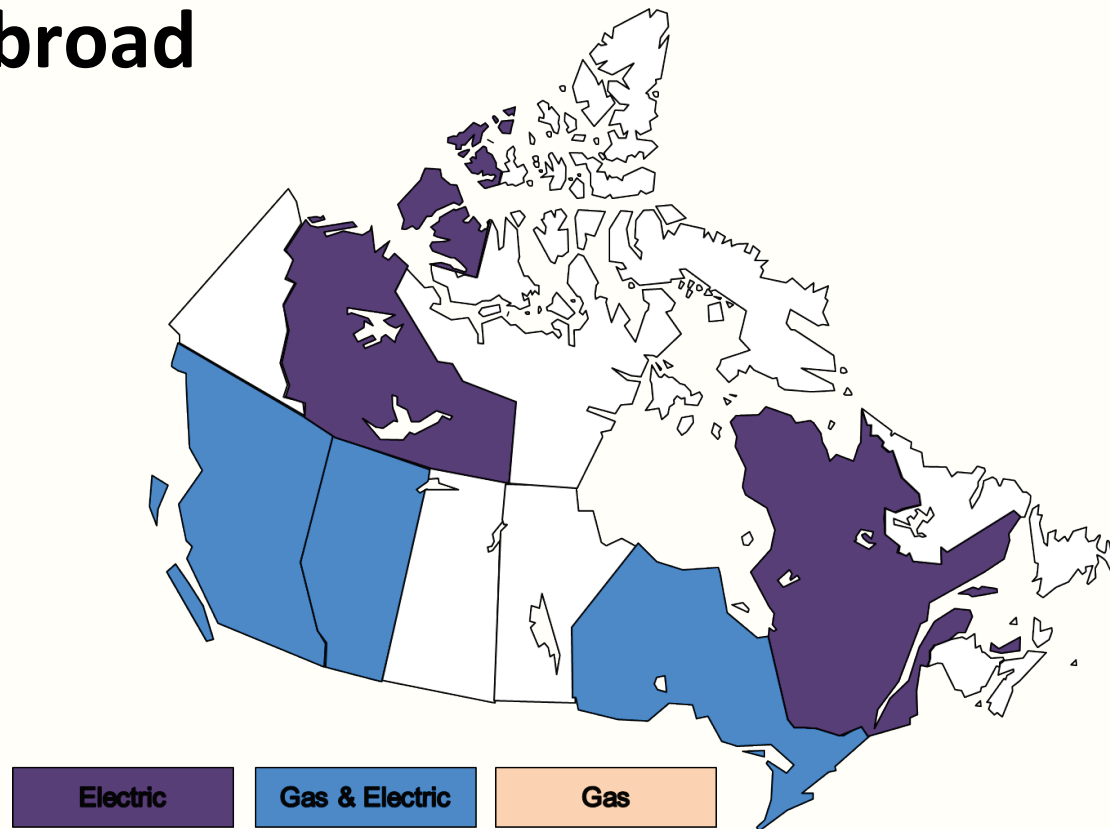
www.pacificeconomicsgroup.com



Supplemental Slides



MRPs Abroad



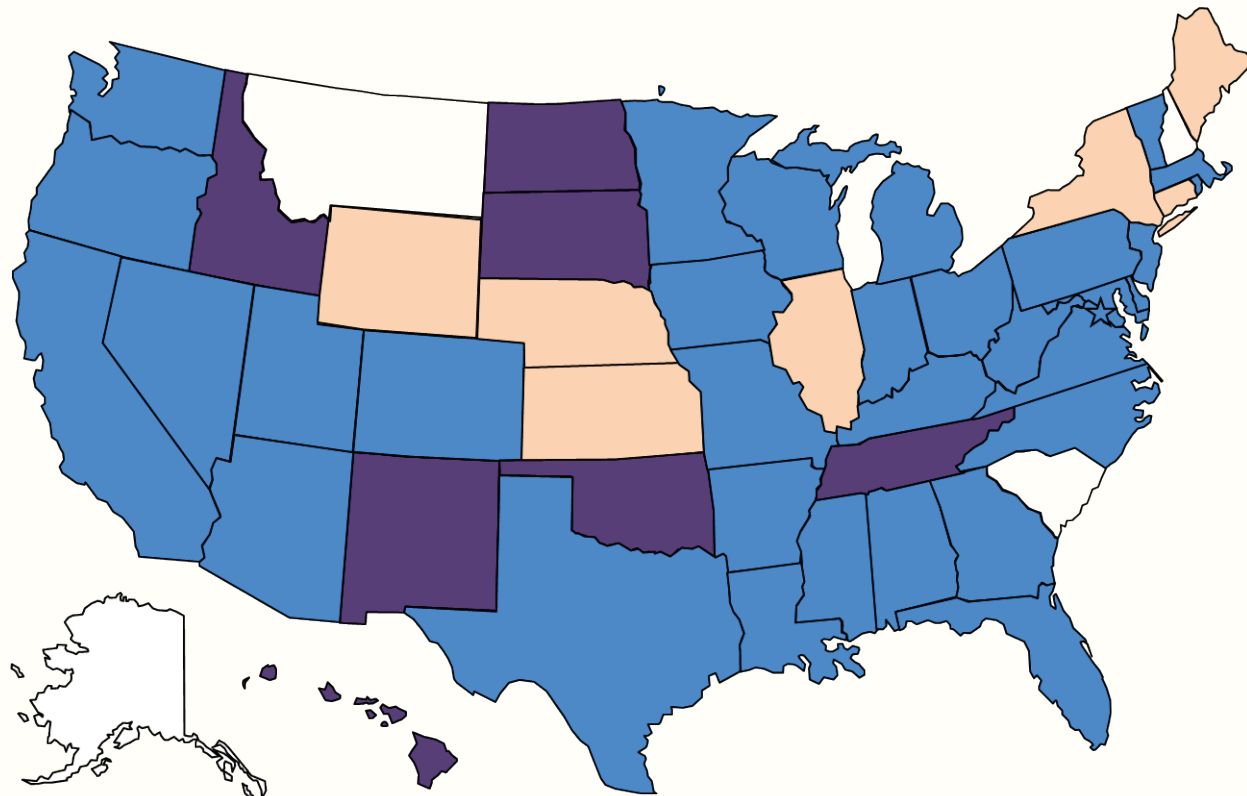
MRPs are more popular in Canada and countries overseas. Ontario and Alberta are North American MRP leaders.

Impetus for MRPs abroad often comes from policymakers and/or regulators.

Recent Capex Tracker Precedents

Capital cost trackers are most popular form of Altreg in US

Especially popular for gas utilities



Electric

Gas & Electric

Gas

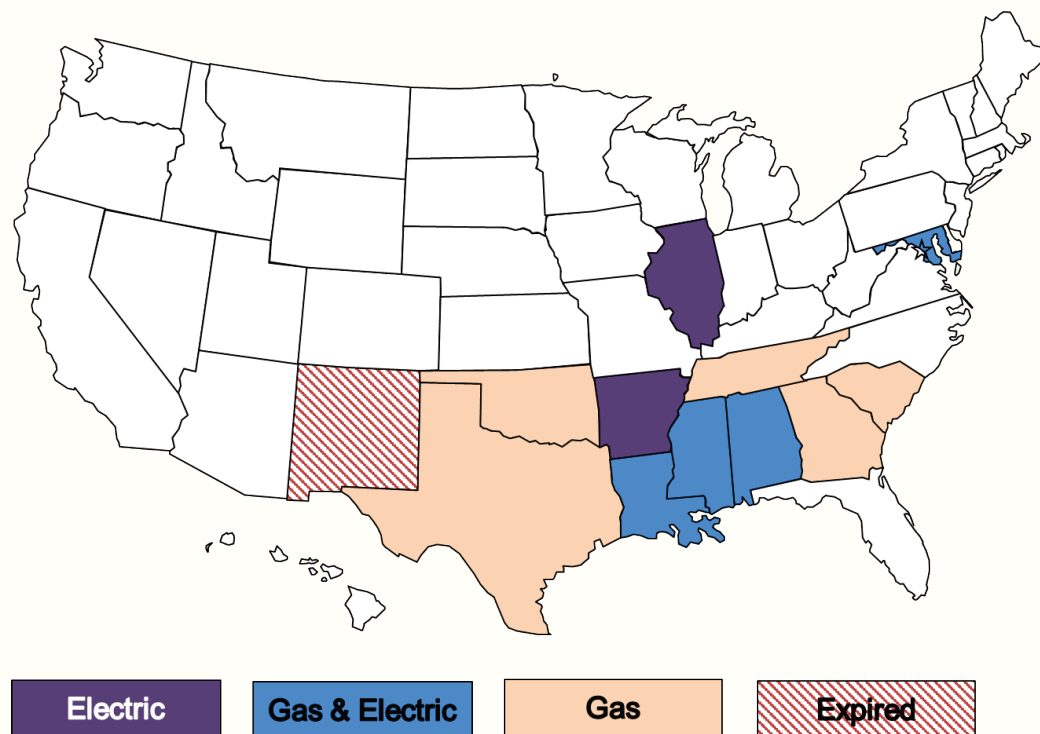
Formula Rate Precedents

Formula rates are the norm for power transmission at Federal Energy Regulatory Commission

Popular for *retail* electric and (especially) gas ratemaking in the Southeast

Alabama was early adopter

Exelon has championed formula rates in Illinois and Mid-Atlantic region



Note: Shaded jurisdictions reflect regulatory approval of formula rate plans for one or more utilities in their jurisdiction.

MRP Case Study: Consolidated Edison of NY

Plan Term: 3 years beginning January 2023

Predetermined Base Revenue: “Stair Steps” Based on Forecasts

<u>2023</u>	<u>2024</u>	<u>2025</u>
6.6%	6.2%	5.8%

Capex underspends trued up at end of plan

Earnings Sharing Mechanism

Revenue Decoupling: Most services

PIMs

- Reliability & customer services
- Energy efficiency
- Policy PIMs encourage peak load reductions, non-wires alternatives, distributed generation (DG), beneficial electrification, and managed EV charging

Reference: New York Public Service Commission Case 22-E-0064

MRP Case Study: Hawaiian Electric Companies

Plan Term: 5 years beginning June 2021

Revenue Cap Index ARM: *growth GDPPI - Productivity Factor - Consumer Dividends*
where Productivity Factor = 0

Cost trackers for exceptional O&M and capital projects, renewable energy interconnections

Revenue Decoupling: All services

Earnings Sharing Mechanism: Symmetric with a +/- 300 basis point deadband

PIMs

- Reliability & customer service quality
- Policy PIMs encourage participation in low-to-moderate income energy efficiency programs and savings; timely DG interconnection approvals and interconnections of large-scale renewables; demand response procurement; early renewable portfolio standard compliance; advanced metering infrastructure (AMI) utilization; and generation reliability.

Expedited Pilot Review Process

Reference: Hawaii Public Utilities Commission Docket 2018-0088

Alternative Ratemaking Treatments for Grid Resilience Programs



Special Resilience Provisions in Two MRP Jurisdictions

California – Wildfire Mitigation Plans

- Utilities required to file wildfire mitigation plans with a full update every 3 years
- Plans must describe the efforts the utility is making to reduce wildfire risks prospectively and be informed by performance on prior wildfire mitigation plan
- Plans reviewed by California Office of Energy Infrastructure Safety
- Costs addressed through a combination of base rates and cost trackers

Florida – Storm Protection Plans

- Utilities must file 10-year storm protection plans and update every 3 years
- Plans must outline systematic approach to reduce restoration costs and outage times associated with extreme weather events and improve reliability
- Plans reviewed by Public Service Commission
- Utility costs of approved plans reviewed annually for prudence; approved costs are afforded capital cost tracker treatment if not already included in base rates

Do MRPs Improve Utility Performance?

PEG studied cost impact of MRPs and extended rate stay-outs in a 2017 Berkeley Lab paper.¹

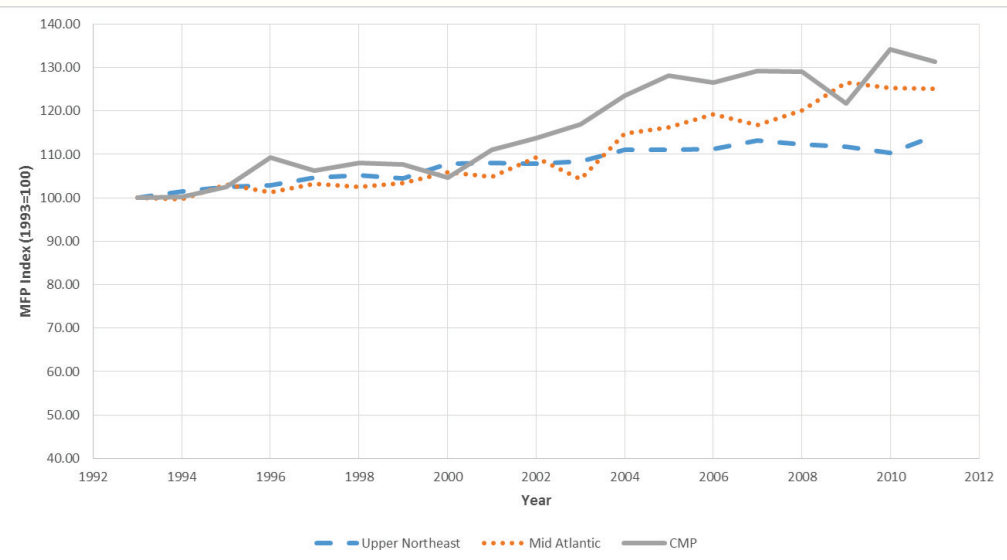
Central Maine Power (CMP) faced material bypass risk from pulp & paper customers in 1990s.

CMP ultimately operated under four consecutive MRPs.

Power distributor productivity growth of CMP under MRPs far exceeded norms for Eastern utilities.

Productivity growth of mid-Atlantic distributors was also quite rapid.

Multifactor Productivity (MFP) Growth Of Central Maine Power and Other Eastern Power Distributors 1994-2011¹



¹Mark N. Lowry, Matt Makos, and Jeff Deason, "State Performance-Based Regulation Using Multiyear Rate Plans for U.S. Electric Utilities, Ed. L. Schwartz, 2017. Available at: https://eta-publications.lbl.gov/sites/default/files/multiyear_rate_plan_gmlc_1.4.29_final_report071217.pdf

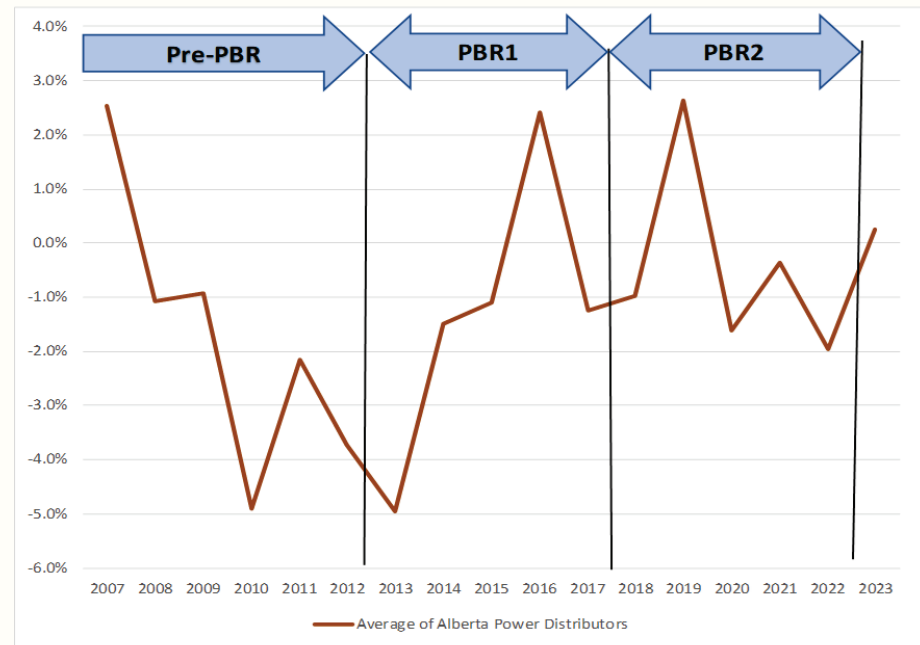
Do MRPs Improve Performance Incentives? (cont'd)

MRPs made mandatory for Alberta gas and electric power distributors after years of frequent rate cases

Recent PEG study found that MRPs accelerated distributors' multifactor productivity growth after years of frequent rate cases¹

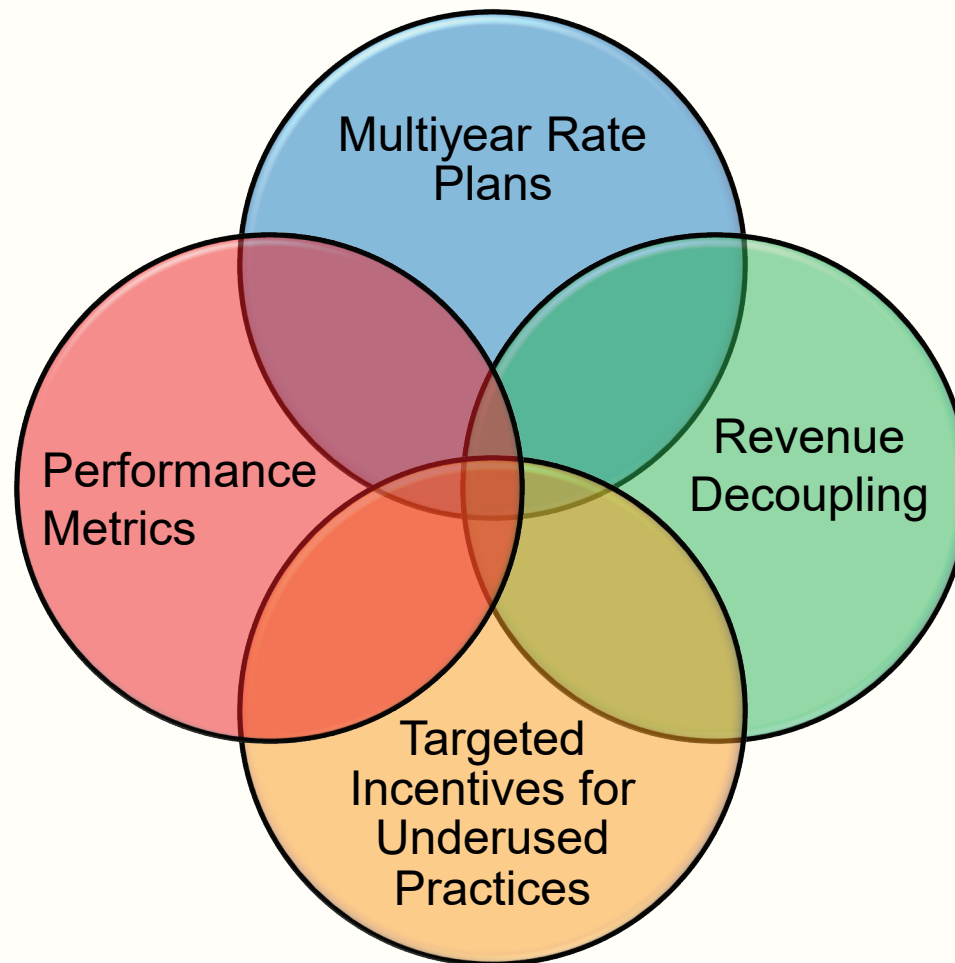
Capital productivity surged when capex cost trackers in PBR1 were replaced in PBR2 with fixed capex budgets based on historical costs¹

Multifactor Productivity Growth of Alberta Power Distributors 2008-2023



¹ Lowry, Mark Newton, David Hovde, Rebecca Kavan, and Matthew Makos. "Impact of Multiyear Rate Plans on Power Distributor Productivity: Evidence from Alberta," *The Electricity Journal*, Volume 36, Issue 5, June 2023.

Basic PBR Approaches Are Often Combined



Britain's "RIIO" approach to ratemaking combines all 4 approaches

Targeted Incentives for Underused Practices: Popular Approaches

Track costs (e.g., DSM, FERC transmission formula rates)

Capitalize costs and add an ROE premium

- Some utilities (e.g., BC Hydro) capitalize DSM expenses
- Transmission ROE premia at FERC
- British regulator capitalizes share of total expenditures (“totex”)

Management fee

Securitization of stranded generation assets

Ex-ante approval (e.g., policy statements and pilot programs)